# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005

JAS-ANZ BSCIC ISO 9001 REGISTERED


Job No.: CTCE/BBMP/W.No.08/NMS/CEMENT/2014-15

Date: 14.11.2014

## TEST REPORT

| | | |
|---|---|---|
| CLIENT | : | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| AGENCY | : | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| NAME OF THE WORK | : | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| REFERENCE | : | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| SAMPLE ID | : | Cement |
| SAMPLES SUPPLIED BY | : | AGENCY |

The results of the tests conducted on the cement sample are as follows:

| Sl.No | Descriptions | Test Method as per IS | Test Result | Requirements as per IS: 8112-2013 |
|---|---|---|---|---|
| 1 | Standard Consistency | IS-4031 (Part -4) | 28.50 % | - |
| 2 | a) Initial Setting Time | IS-4031 (Part -5) | 125 Minutes | Not Less than 30 Minutes |
| | b) Final Setting Time | IS-4031 (Part -5) | 450 Minutes | Not More than 600 Minutes |
| 3 | Soundness by the Le-Chatelier method | IS-4031 (Part 3) | 1 mm | Not more than 10 mm |

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Job No.: CTCE/BBMP/W.No.08/NMS/SAND/2014-15 : 14.11.2014

## TEST REPORT ON FINE AGGREGATES (SAND)
## IS 383-1970 (RA- 2002)

**Client** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

**Agency** : **Mr. N.M. Shivakumar,** Contractor, Bangalore.

**Name of Work** : Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.

**Reference** : AEE/KSD/PR/ /2014-15 Dated: 12.11.2014

Date of Testing : 14.11.2014

Material : Sand Total Wt. of Aggregates in gms **1000**

| Is Sieve Size in mm | Weight Retained (gm) | Retained Weight in % | Cumulative Retained Weight in % | Cumulative Weight Passing in % | Spec.Limits For Zone-II |
|---|---|---|---|---|---|
| 10 | 0 | 0 | 0 | 100 | 100 |
| 4.75 | 73 | 7.30 | 7.30 | 92.7 | 90-100 |
| 2.36 | 158 | 15.80 | 23.10 | 76.9 | 75-100 |
| 1.18 | 193 | 19.30 | 42.40 | 57.6 | 55-90 |
| 600 Micron | 214 | 21.40 | 63.80 | 36.2 | 35-59 |
| 300 Micron | 245 | 24.50 | 88.30 | 11.7 | 8-30 |
| 150 Micron | 83 | 8.30 | 96.60 | 3.4 | 0-10 |

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Job No.: CTCE/BBMP/W.No.08/NMS/AGG/2014-15 : 14.11.2014

## TEST REPORT ON COARSE AGGREGATES
## IS 383-1970 (RA- 2002)

**Client** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

**Agency** : **Mr. N.M. Shivakumar,** Contractor, Bangalore.

**Name of Work** : Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.

**Reference** : AEE/KSD/PR/ /2014-15 Dated: 12.11.2014

Date of Testing : 14.11.2014

Material : 40mm Aggregates

Total Wt. of Aggregates in gms **26000**

| Is Sieve Size in mm | Weight Retained (gm) | Retained Weight in % | Cumulative Retained Weight in % | Cumulative Weight Passing in % | Spec.Limits |
|---|---|---|---|---|---|
| 80 | 0 | 0 | 0 | 100 | 100 |
| 40 | 856 | 3.29 | 3.29 | 96.71 | 95-100 |
| 20 | 16214 | 62.36 | 65.65 | 34.35 | 30-70 |
| 10 | 5983 | 23.01 | 88.67 | 11.33 | 10-35 |
| 4.75 | 2475 | 9.52 | 98.18 | 1.82 | 0-5 |

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Job No.: CTCE/BBMP/W.No.08/NMS/STEEL/2014-15 14.11.2014

## TEST REPORT ON REINFORCEMENT STEEL

| | | |
|---|---|---|
| Client | : | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | : | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| Name of the Work | : | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| Reference | : | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| Date of Test | : | 14.11.2014 |
| Technical Reference | : | IS: 1786-2008 |

| Sl. No | Nominal size (dia) (mm) | Mass per metre (Kg/mtr) | TENSILE STRENGTH | | | Bend Test | Rebend Test |
|---|---|---|---|---|---|---|---|
| | | | 0.20% proof stress/Yield stress $N/mm^2$ | Tensile strength (Ultimate stress) $N/mm^2$ | Elongation percent gauge length | | |
| 1 | 8 | 0.40 | 512 | 555 | 13.05 | O.K | O.K |

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Job No.: CTCE/BBMP/W.No.08/NMS/STEEL/2014-15 14.11.2014

## TEST REPORT ON REINFORCEMENT STEEL

| | | |
|---|---|---|
| Client | : | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | : | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| Name of the Work | : | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| Reference | : | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| Date of Test | : | 14.11.2014 |
| Technical Reference | : | IS: 1786-2008 |

| Sl. No | Nominal size (dia) (mm) | Mass per metre (Kg/mtr) | TENSILE STRENGTH | | | Bend Test | Rebend Test |
|---|---|---|---|---|---|---|---|
| | | | 0.20% proof stress/Yield stress $N/mm^2$ | Tensile strength (Ultimate stress) $N/mm^2$ | Elongation percent gauge length | | |
| 1 | 10 | 0.62 | 514 | 557 | 13.20 | O.K | O.K |

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Job No.: CTCE/BBMP/W.No.08/NMS/CUBE/2014-15 14.12.2014

## TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

| | |
|---|---|
| **Client** | : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| **Agency** | : **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| **Name of the work** | : Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| **Reference** | : AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| **Sample ID** | : Cement Concrete |
| **Size of cubes** | : 150mmx150mmx150mm |
| **Cross Sectional Area** | : 22500 $mm^2$ |
| **Technical Reference** | : IS: 516-1959 (Reaffirmed 2008) |
| **Grade of Concrete** | : $M_{20}$ |
| **Compressive Strength as on** | : $28^{th}$ day |

| Sl.No. | Date of casting | Date of testing | Weight of cube (Kg) | Failure load (KN) | Compressive strength ($N/mm^2$) |
|---|---|---|---|---|---|
| 1 | 16.11.2014 | 14.12.2014 | 8.124 | 513.6 | 22.83 |
| 2 | 16.11.2014 | 14.12.2014 | 8.195 | 493.7 | 21.94 |
| 3 | 16.11.2014 | 14.12.2014 | 8.271 | 472.8 | 21.01 |

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Job No.: CTCE/BBMP/W.No.08/NMS/SDBC(QB)/2014-15 19.11.2014

## TEST REPORT

| | | |
|---|---|---|
| CLIENT | : | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| AGENCY | : | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| NAME OF THE WORK | : | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| REFERENCE | : | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| SAMPLE ID | : | Bitumen |
| DATE OF TESTING | | 19.11.2014 |

The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

| Sl. No | Description | Test Method as per IS | Test Result | Requirement as per IS:73:2013 |
|---|---|---|---|---|
| 1 | Penetration at 25 $^0$C, 1/10 mm | IS :1203 -1978 (RA-2009) | 89 | 80 to 100 |
| 2 | Softening point, $^0$C | IS :1205 -1978 (RA-2009) | 45 | Min. 40 |
| 3 | Ductility at 27$^0$C, cm | IS :1208 -1978 (RA-2009) | 100 > | Min. 75 |
| 4 | Flash Point, $^0$C | IS :1209 -1978 (RA-2009) | 254 | Min. 220 |

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Job No.: CTCE/BBMP/W.No.08/NMS/SDBC/AIV/2014-15 19.11.2014

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| **Name of the Work** | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| **Reference** | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| **Source / Location** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Date of Testing** | 19.11.2014 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 375 | 378 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 78 | 81 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 297 | 297 | |
| 4 | Aggregate Impact value = percent fines 100* ($W_2/W_1$)% | 20.80 | 21.43 | 21.11 |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.08/NMS/SDBC/Shape_T/2014-15 19.11.2014

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| Name of Work | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| Reference | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 19.11.2014 |

Result : Flakiness Index = **11.97%**

Elongation Index = **13.58%**

Result : Combined Flakiness & Elongation index 25.55%

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.08/NMS/SDBC/Stripping/2014-15 21.11.2014

## Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| Name of the work | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| Reference | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 21.11.2014 |

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

| Observation Number | Stripping, Percentage | Average, Percentage | Average Retained Coating, % |
|---|---|---|---|
| 1 | 2.5 | 2.70 | 97.30 |
| 2 | 2.7 | | |
| 3 | 2.9 | | |

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.08/NMS/Sp_Wa/2014-15 21.11.2014

## Specific Gravity And Water Absorption Test

IS: 2386 Part III

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| Name of the Work | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| Reference | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| Type of Mix | Semi Dense Bituminous Concrete |
| Source / Location | Hotmix Plant, Bangalore |
| Date of Testing | 21.11.2014 |

| Sl. No. | Details | Notation | Test Number | | | Mean Value |
|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | |
| 1 | Weight of aggregate suspended in water with the basket | $W_1$ g | 1995 | 2009 | 2011 | |
| 2 | Weight of basket suspended in water | $W_2$ g | 755 | 755 | 755 | |
| 3 | Weight of saturated aggregate in water | $(W_1 - W_2) = W_s$ g | 1240 | 1254 | 1256 | |
| 4 | Weight of saturated surface dry aggregate in air | $W_3$ g | 2005 | 2013 | 2015 | |
| 5 | Weight of water equal to the volume of the aggregate | $(W_3 - W_S)$ g | 765 | 759 | 759 | |
| 6 | Weight of oven dried aggregate | $W_4$ g | 1991 | 1998 | 1998 | |
| 7 | Specific Gravity | $W_4/(W_3-W_S)$ | 2.603 | 2.632 | 2.632 | 2.622 |
| 8 | Apparent Specific gravity | $W_4/(W_4-W_S)$ | 2.651 | 2.685 | 2.693 | 2.676 |
| 9 | Water Absorption | $((W_3-W_4)*100)/W_4$ | 0.70% | 0.75% | 0.85% | 0.77% |

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0

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Job No.: CTCE/BBMP/W.No.08/NMS/SDBC/AGG/2014-15 21.11.2014

## Aggregate Gradation Test

IS : 2386 Part I

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore. |
| Agency | **Mr. N.M. Shivakumar,** Contractor, Bangalore. |
| Name of the Work | Improvements to Roads and Drains nearby Providence Trust Apartment at Kodigehalli in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore. |
| Reference | AEE/KSD/PR/ /2014-15 Dated: 12.11.2014 |
| Sample I / D | Hot Mix Plant, Bangalore |
| Type of Mix | Semi Dense Bituminous Concrete (SDBC) |
| Date of Testing | 21.11.2014 |

Total Weight of Sample: 5525 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade-II MORTH specification |
| 9.5 | 473 | 8.6 | 8.56 | 91.44 | 90-100 | |
| 4.75 | 2865 | 51.9 | 60.42 | 39.58 | 35-51 | |
| 2.36 | 735 | 13.3 | 73.72 | 26.28 | 24-39 | |
| 1.18 | 462 | 8.4 | 82.08 | 17.92 | 15-30 | |
| 0.3 | 358 | 6.5 | 88.56 | 11.44 | 9-19 | |
| 0.075 | 281 | 5.1 | 93.65 | 6.35 | 3-8 | |

Total Weight of Sample: 5575 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade-II MORTH specification |
| 9.5 | 386 | 6.9 | 6.92 | 93.08 | 90-100 | |
| 4.75 | 2975 | 53.4 | 60.29 | 39.71 | 35-51 | |
| 2.36 | 734 | 13.2 | 73.45 | 26.55 | 24-39 | |
| 1.18 | 447 | 8.0 | 81.47 | 18.53 | 15-30 | |
| 0.3 | 268 | 4.8 | 86.28 | 13.72 | 9-19 | |
| 0.075 | 385 | 6.9 | 93.18 | 6.82 | 3-8 | |

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